Allocation of emission allowances must change

Jan Berends, Manager Environmental Affairs at Royal DSM,
Vianney Schyns, Manager Climate & Energy Efficiency at USG (joint venture of DSM and SABIC)
(jan.berends@dsm.com)

European CO_2 emissions trading leads to serious market distortions and 'windfall profits' of more than 20 - 30 billion euros a year. This is caused by the method of allocation of emission allowances to companies. A different method of allocation is urgently needed.

Promoting efficiency improvement

In 1997, agreements were made in Kyoto about reduction of global greenhouse gas emissions. The European Union committed itself to a reduction averaging 8% over the years 2008 – 2012, compared to the 1990 emission level. This commitment has been shared by the Member States with differentiated targets. Carbon dioxide (CO_2) is one of the main greenhouse gases. It is released when fossil fuels are used for power generation and for the production of steel, cement, ammonia, plastics, etc. Other major sources of carbon dioxide emissions are traffic and households. As a consequence of population growth and increasing wealth, the global demand for electricity and industrial products is increasing. This implies that the reduction in CO_2 emissions will have to be realized by producing more efficiently: less CO_2 and less energy consumption per unit of product. Costs for raw material and energy are major reasons for companies to enhance their efficiency. Since 1990, European industrial producers have improved their energy efficiency on average by 1% to 1.5% a year, but due to the economic growth this has not resulted in a substantial decrease in industrial CO_2 emissions. It can be concluded that additional incentives are needed to reduce overall CO_2 emissions. Emissions trading is intended to be one of these.

The current allocation system

The implementation in 2005 of the European Emissions Trading Directive (Directive 2003/87/EC, ref.1) marked the start of the trade in emission allowances for greenhouse gases. The Directive's stated aim is to promote reduction of greenhouse gas emissions '*with the least possible diminution of economic development and employmen*t' (recital 5, Directive 2003/87/EC).
Companies covered by the Directive are not allowed to emit more greenhouse gases than they have emission allowances for. Each company is awarded a certain quantity of emission allowances, which can be traded freely within the EU. When a company's CO_2 emissions exceed its emission allowances, it must purchase additional allowances. If its emissions are lower, it can sell the allowances it does not use.

The Member States are to draw up a National Allocation Plan (NAP) for a certain trading period that indicates the total quantity of emission allowances they will allocate and how these will be distributed among individual companies. In all Member States the emission allowances for the period 2005 – 2008 have been allocated on the basis of the CO_2 emissions of each individual company in preceding years. This method is referred to as 'historical grandfathering'. In the draft allocation plans that have so far been submitted for the second trading period, 2008 – 2012, this 'grandfathering' concept is again applied.

Problems resulting from 'historical grandfathering'

The possibility of trading emission allowances should persuade companies to invest in efficiency improvement. The underlying idea is that a company that invests in CO_2 reduction can sell emission allowances and so recoup its extra investments. However, so far there has been hardly any proof that companies are actually making investments in order to be able to sell emission allowances. One of the explanations for this is that companies that take reduction measures risk receiving a lower quantity of allowances in the next period, making it uncertain whether they will recoup their extra investments. An extreme example is a power plant with an investment in CO_2 removal from its off-gas (Carbon Capture & Sequestration, or CCS). In most Member States this plant would not receive any allowances, in contrast with a power plant that emits the 'normal' quantity of CO_2. Some changes are emerging, such as the new German NAP in which plants receive the same allocation whether or not they apply CCS. But still gas-fired power plants and combined heat & power receive 50% less allowances compared with a coal- or lignite-fired plant

Market distortions

The allocation of a fixed quantity of tradable emission allowances to individual companies affects the competitive conditions. Companies increasing their market share need to purchase emission allowances for the CO_2 released due to higher production levels. To recoup these costs, the margin on the additional production volume should be sufficiently high. This, in effect, implies that emissions trading makes it more difficult, if not impossible, to gain on existing producers from the market. A case in point is electricity: in this market, any efforts to gain additional market share are to be regarded as a 'zero sum game' at a price of CO_2 above 10 – 20 euro per ton. The margin on the additional sales is to be spent entirely on the purchase of emission allowances. This effect completely frustrates the desired liberalisation of the electricity market.

If the price of CO_2 is high, for a number of products the value of the emission allowances will exceed the gross margin (selling price minus variable costs). In such a case, selling emission allowances will be more profitable than producing product (Table 1). This will result in production inside the EU being ousted by imports. This does not reduce global CO_2 emissions, so there are no environmental benefits.

Table 1. Indication of the value of emission allowances relative to the market price and the margin for some products, based on a price of emission allowances of €30 per tonne of CO_2 (source: DSM/USG)

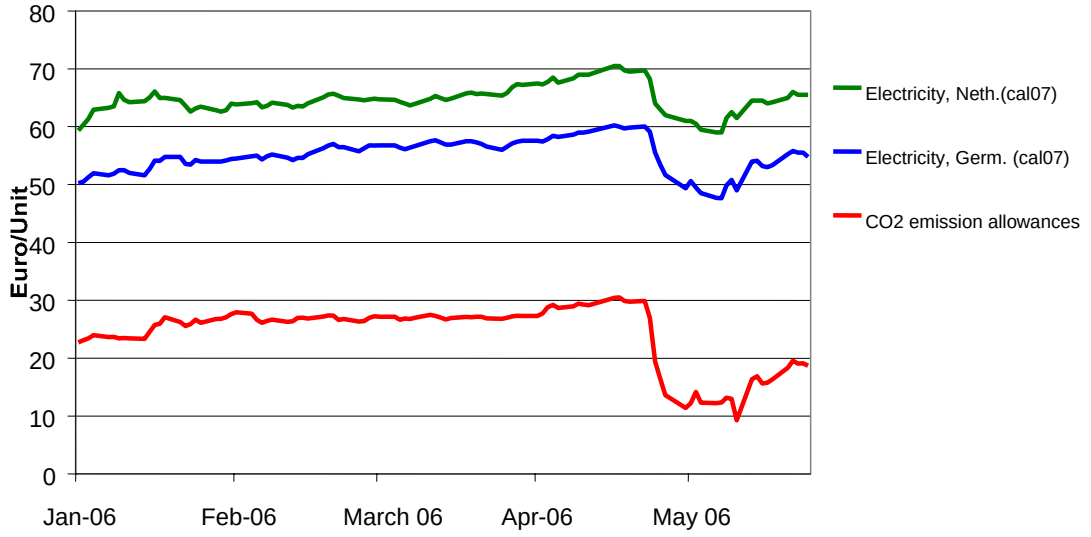
	Emission (tonne of CO2 per unit product)	*Market price (€ per unit product)*	*Gross margin (€ per unit product)*	*Value of emission allowances (€ per unit product)*
Cement (tonne)	1.0	80 - 120	25 – 40	30
Ammonia (tonne)	0.7	130 - 160	50 – 100	20 [1]
Steel (tonne)	1.8	350 - 450	40 - 80	54
Electricity, coal-based (MWh)	0.9	30 - 40	15 – 20	27
Electricity, natural gas-based (MWh)	0.4	50 - 60	10 – 15	12

[1] Excluding process emission; if the process emission is included this is € 60

Windfall profits for the electricity sector

Historical grandfathering makes it possible for companies to sell their emission allowances when they cut down production. If import from outside the EU is not possible, as in the case of electricity, this will result in a tight market, rising prices and windfall profits.This effect is now generally recognized (ref. 2). It has long been unclear how high exactly these windfall profits are. Since coal-based power stations largely determine the price of electricity in Europe, their cost structure has a predominant effect on the windfall profits. A classical coal-fired power plant operating at an efficiency of 37% has an emission level of the order of 1 tonne of CO_2/MWh, while fixed costs amount to €15 to €20 per MWh. These costs are already recouped when the emission allowances are sold at a price of €15 to € 20 per tonne of CO_2. At a higher CO_2 price, the extra value of the emission allowances should be taken into account in the price of electricity to ensure economic production. The size of the windfall profits was seriously underestimated before the start of emission trading, for one thing because the price per tonne of CO_2 was taken to be €5 (ref. 3). At such a low price, a reduction in production is not an economically attractive option. The size of the windfall profits is evident from a comparison of the development of the price of CO_2 emission allowances and wholesale electricity prices in April 2006 (Fig. 1).

Price development of CO2 emission allowances and electricity (supply before 2007) in the Netherlands and Germany (source: USG, Urmond, the Netherlands)



Rumours about a structural surplus of emission allowances (ref. 4) at the end of April 2006 caused the price of emission allowances to drop rapidly from €30 to €12 per tonne of CO_2. This was followed by a decrease in the wholesale price of electricity in both Germany and the Netherlands by about €12 per MWh. When this is converted to overall electricity production in Europe (3,000 million MWh), the windfall profits thus amount to about €36 billion a year at a CO_2 price of €30. State interventions may reduce this effect to a certain extend in some Member States. However, since a lower quantity of emission allowances will be allocated in the second trading period, the price per tonne of CO_2 and thus the windfall profits may turn out to be substantially higher in the period between 2008 and 2012. The preferential treatment of electricity producers at the expense of consumers conflicts with one of the criteria formulated in the Directive (criterion 5, Annex III, ref. 1). In 2006, the European Commission set up a High Level Group (HLG) for Competitiveness, Energy and the Environment to study the effect on competitiveness and other issues. This HLG recommended that the rules for allocation of emission allowances be improved at short notice (ref. 5).

A different way: no production, no allowances

The problems of market distortions and windfall profits can be solved by changing the method by which emission allowances are allocated to individual companies. Allocation should not be based on past emissions but, rather, on actual production levels and standards per unit product. This would mean that the efficiency at which production takes place determines whether or not emission allowances can be traded. Companies that fail to meet the production efficiency standard will have to purchase additional emission allowances, while companies that are doing better than the standard can sell emission allowances. It would no longer be possible to sell emission allowances by reducing production: if you do not produce, you do not receive any emission allowances. This

would eliminate the above-mentioned market distortions and windfall profits. Moreover, it is important that European producers that meet the standard will continue to be able to compete in the global market. The standards for allocation per unit product should take account of the technological potential for efficiency improvement. To this end, benchmark studies should be carried out to determine and compare the efficiency of existing installations. In the Netherlands, extensive experience has been gained with this method in the framework of the Energy Efficiency Benchmarking Covenant that was concluded in 1999. The benchmark studies have been conducted by independent consultants working under government supervision. To be able to set standards for 90% of the relevant emissions in Europe, some 40 of such benchmark studies are needed. Half of these have already been conducted, and the second half can be completed before the end of 2006 on the basis of the EU emission data of 2005. Allocation on the basis of standards per unit product can be illustrated using the following example of a power station.

Allocation of emission allowances to a 500 MW power station on the basis of actual production levels and a standard per unit product

In the example below it has been assumed that from the benchmark study a standard of 0.7 ton of CO_2/MWh is concluded. Under the National Allocation Plan (NAP) this standard and a planned production of 3.5 million MWh per year for five years results in emission allowances for (0.7 x 3.5 x 5 =) 12.25 million tonnes of CO_2 being earmarked for allocation to this facility. The emission allowances issued each year are based on the standard and the actual production level in the preceding year.

Year	Actual production (million MWh)	Allocated emission allowances (million tonnes of CO_2)
2007	3.50	-
2008	3.00	2.45
2009	3.50	2.10
2010	4.00	2.45
2011	2.50	2.80
2012	3.00	1.75
2013	4.00	
Total, 2008 – 2012		11.55

In this case the total allocation for the considered period is lower than the quantity intended to be allocated in NAP because actual production is lower than the planned production. The surplus (12.25 – 11.55) is added to the reserve. If the actual production is higher than the forecast allowances will be taken from the reserve. In case the reserve is exhausted, the deficit is allocated in the form of 'forward credits' that can be converted into emission allowances in 2013.

The example is based on a single standard for electricity, irrespective of the type of fuel used (coal, natural gas) of 0.7 ton of CO_2 per MWh. This implies that for a classical coal-based power station emitting 1 ton of CO_2 per MWh additional emission allowances for 0.3 ton of CO_2 per MWh should be purchased. An efficient gas-fueled power station emitting 0.4 ton of CO_2/MWh would have an advantage of 0.3 ton of CO_2 per MWh. The

differentiation between technologies and fuels is exactly the same as in case auctioning would be applied. However, in contrast to full auctioning, the total costs for emission allowances are limited to the costs for fuel switch which are required for the reduction according to the Kyoto agreement. The benefits and costs of different fuels offset each other, gas being marginal at peak demand and coal at base load demand.
It was sometimes asserted that one single standard for electricity would be the deathblow for coal and lignite. This is a misunderstanding. For coal-fired power plants the cost associated with one standard being typically one third of today's opportunity costs, can be factored in the electricity price. Conventional coal- and lignite-fired power plants will in the long term lose market share. This loss depends on the stringency of the total cap, not on the choice between allocation methods.

A major option for power generation efficiency improvement is the use of CHP (Combined Heat and Power) plants. Such facilities produce not only electricity but also useful heat in the form of steam. This efficient form of process integration can be promoted by allocating also emission allowances for the steam that is generated. Another option for reduction is removal of CO_2 from off-gases, which may become economically attractive at a price exceeding €25 to €30 per ton of CO_2. These 'clean coal' technologies (CCS) will play an important role in the coming decades since coal is abundantly available and for the time being remains indispensable for our energy supply. The first investment decisions for full scale power plants with CCS are expected during the second trading period. The latest prospect is that the designs for new coal- and lignite-fired power plants can already now be made "capture ready" (ref. 6). This possibility is good news for the environmental objective and commercially beneficial. Therefore it is of utmost importance to get consistent allocation rules with clear incentives for low carbon technologies. Another reason is to turn the EU Emissions Trading Scheme into a blueprint for the world, which is of vital importance for an agreement on a global climate policy. When no distinction is made between the types of fuel or the technologies applied in the allocation of emission allowances per unit product, the market mechanism will ensure that optimization is achieved and the government will not have to assume the role of the entrepreneur in the liberalised electricity market.

Guaranteed total cap

Binding international and European agreements have been concluded regarding the overall emissions in the period between 2008 and 2012. It is therefore important to have absolute guarantees that the total quantity of allowances available for emissions is not exceeded. Therefore, a contingency reserve should be available for a situation in which economic growth is higher than the level taken into account in determining the benchmarks. In case of an even higher growth, the contingency reserve may be not sufficient. This might occur towards the end of the trading period. Should such a situation arise, one option would be to issue 'forward credits', a voucher for emission allowances in the next trading period (2013 – 2017). In that case, the companies themselves will have to purchase the emission allowances they still need for the current trading period in the European market, but they will be compensated for that in the next period. Obviously, the price of emission allowances will increase when forward credits are needed. This will

mean an extra boost for efficiency improvements, for which there will be more opportunities when economic growth is above expectations.

Alternative is compatible with Emission Trading Directive

The question that needs to be answered is whether the proposed allocation method is compatible with the Emission Trading Directive since the Directive cannot be changed in the short term. The Directive requires from the Member States: to determine before the start of the trading period (1) the total quantity of emission allowances that will be allocated, and (2) the method of allocation to installations. Before the start of the trading period Member States have to *'initiate the process for the allocation'* to the individual companies.The National Allocation Plan must include a list of the installations covered by the Directive *'with the quantities of allowances intended to be allocated to each'*. The intention to allocate does not mean that emission allowances must actually be granted, just as the intention to produce not inevitably leads to actual production. It is, for instance, not the intention of the Directive to allocate allowances after an installation is shut down during the trading period (see for example ref. 7). The allowances intended for allocation to 'new entrants', too, will actually be allocated only if and when a newcomer actually starts producing during the trading period. It should therefore be concluded that the Directive allows scope for making the allocation of emission allowances dependent on the production, provided the total quantity for all installations covered by the Directive is not exceeded. This would not only mean that the total cap is guaranteed, but also that recital 20 of the Directive is observed: '.....*to encourage the use of more energy-efficient technologies, including combined heat and power technology, producing less emissions per unit of output...*'

J. Berends
J.A.J.V. Schyns

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